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Proceedings of the Regional Assessment of Scallops (*Placopecten magellanicus*) in Scallop Fishing Area (SFA) 29 West of 65°30'

March 24, 2015
Dartmouth, Nova Scotia

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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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SUMMARY

This scallop fishery has taken place since 2001 in the portion of Scallop Fishing Area (SFA) 29 west of longitude 65°30'W (or SFA 29 West). The Full Bay (FB) scallop fleet was the sole participant in 2001. Starting in 2002, the total allowable catch was shared between the FB fleet and a number of inshore East of Baccaro (EoB) licence holders who were eligible to fish in SFA 29 West. The last assessment of the fishery was completed on March 13, 2014. As part of the Regional Science Advisory Process, a meeting was held on March 24, 2015, at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia, to review the 2014 scallop fishery and assess the status of the scallop stock in SFA 29 West in support of the management of the 2015 fishery. Two Working Papers were reviewed at the meeting: stock status and proposed reference points. Peer reviewers and meeting participants felt that both Working Papers were thorough, scientifically sound, and well done. Meeting participants reviewed the Science Advisory Report section-by-section; the document was very similar to the last version of the report previously agreed upon in March 2014. There was overall support for the proposed Science Advisory Report, with minor edits discussed at the meeting to be adopted in the final format. Disagreement by one meeting participant regarding characterization of EoB licences remained, however, with the nature of the disagreement captured in the following Proceeding. The Science Advisory Report received overall consensus at the meeting.

Compte rendu de l'évaluation régionale du stock de pétoncles (*Placopecten magellanicus*) de la zone de pêche du pétoncle (ZPP) 29 à l'ouest de la longitude 65° 30' O

SOMMAIRE

La pêche du pétoncle est pratiquée dans la partie de la zone de pêche du pétoncle (ZPP) 29 située à l'ouest de la longitude 65° 30' O depuis 2001. En 2001, seule la flottille de pêche du pétoncle de la totalité de la baie a pratiqué cette pêche. Depuis 2002, le total autorisé des captures était partagé entre la flottille de la totalité de la baie et un certain nombre de titulaires de permis de pêche côtière pour l'est de Baccaro qui étaient autorisés à pêcher dans la ZPP 29 ouest. La dernière évaluation de la pêche a été réalisée le 13 mars 2014. Dans le cadre du processus d'avis scientifique régional, une réunion s'est tenue le 24 mars 2015 à l'Institut océanographique de Bedford, à Dartmouth, en Nouvelle-Écosse, dans le but d'examiner les résultats de la pêche du pétoncle de 2014 et d'évaluer l'état du stock de pétoncles de la ZPP 29 ouest à l'appui de la gestion de la pêche en 2015. On a examiné deux documents de travail lors de la réunion, à savoir l'état du stock et les points de référence proposés. Les pairs examinateurs et les participants étaient d'avis que les deux documents de travail étaient très détaillés, rigoureux sur le plan scientifique et bien faits. Après avoir examiné l'avis scientifique section par section, les participants ont constaté que le document était très semblable à la dernière version du rapport approuvé en mars 2014. En général, ils ont donné leur accord à l'avis scientifique proposé, sous réserve que les modifications mineures discutées lors de la réunion soient adoptées dans la version définitive. Toutefois, un participant est toujours en désaccord avec la caractérisation des permis pour l'est de Baccaro. La nature de ce désaccord figure dans le compte rendu ci-dessous. L'avis scientifique a fait l'objet d'un consensus général au cours de la réunion.

INTRODUCTION

This scallop fishery has taken place since 2001 in the portion of Scallop Fishing Area (SFA) 29 west of longitude 65°30'W (or SFA 29 West). The Full Bay (FB) scallop fleet was the sole participant in 2001. Starting in 2002, the total allowable catch (TAC) was shared between the FB fleet and a number of inshore East of Baccaro (EoB) licence holders who were eligible to fish in SFA 29 West. The last assessment of the fishery was completed on March 13, 2014 (DFO 2014). As part of the Regional Science Advisory Process, a meeting was held on March 24, 2015, at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia, to review the 2014 scallop fishery and assess the status of the scallop stock in SFA 29 West in support of management of the 2015 fishery. Specifically, the meeting was called to provide science advice for the SFA 29 West scallop fishery by subarea based on a state-space habitat-based population model for subareas A–D, which was and accepted at a science assessment framework meeting in February 2014. The model is based on a scallop habitat map – the map does not cover subarea E.

A science update was originally scheduled for SFA 29 West in 2015; however, due to observations from the science survey in 2014 that an extremely strong year class which prompted closure of subareas C and D in 2014 was very much diminished, a full assessment was triggered. An assessment of lobster bycatch was also presented at the meeting. The meeting Chair-person, Mr. Kristian Curran, first introduced himself, followed by an introduction of meeting participants (Appendix 1). The Chair thanked meeting participants for attending the DFO Science Advisory Process. The Chair provided a brief overview of the Canadian Science Advisory Secretariat (CSAS) science advisory process and invited participants to review the meeting Terms of Reference (Appendix 2) and Agenda (Appendix 3). No revisions or additions were made to the Terms of Reference or Agenda. To guide discussion, two Working Papers were provided to meeting participants on November 19 and 20, 2014, respectively, in advance of the meeting date. This Proceeding constitutes a record of meeting discussions and conclusions.

PRESENTATION AND DISCUSSION

Rapporteur: Andrew Newbould

PRESENTATION OF WORKING PAPERS

Stock Status

Presenter: Jessica Sameoto

The SFA 29 West scallop science lead, Ms. Jessica Sameoto, reviewed the 2014 fishery and survey. Co-presenter Stephen Smith also provided input into the discussion. The discussion focused on various aspects of the Working Paper, including: fishery and survey, condition, and biomass.

Fishery and Survey

The presenter reviewed the 2014 fishery and survey. It was asked how many fishing trips typically occur in a season. The presenter noted that 42 vessels fished in 2014, so the target coverage by fishery observers would be 42 days (38 days were actually observed, based on Observer reports), with 552 total fishing days occurring in the 2014 season. That presenter further noted that areas in which fishing occurred in 2014 were similar to those fished in previous years in subareas A, B, and E. A meeting participant subsequently noted that there is

sometimes a shortage of fishery observers available during the summer due to other fisheries that are on-going at that time. The presenter emphasized that log book data that is submitted is very useful and that DFO Science really appreciates it when industry fills out the logbooks correctly.

A meeting participant noted that commencing in 2006-2007, there appears to be a bias in the survey by subarea. The presenter clarified that this is not a bias rather the survey is adjusted to provide more accurate information for each subarea. A peer reviewer subsequently inquired if the presenter felt the survey occurring after the fishery may influence survey results due to depletion (e.g. fishing does not appear to occur in most of subarea A where the survey suggests there are commercial abundances). The presenter noted that this is not an issue, and that other factors determine where fishing occurs; particularly in subarea A where depth is greater and the subarea is farther from shore. The presenter further noted that a sublegal year class in subarea A observed in 2013 was not picked up in the 2014 survey. It was indicated that although there was change to the survey design in 2014, an intensive review of tows was undertaken, which demonstrated the missing year classes were a real observation and not a result of survey change.

A peer reviewer questioned if because growth is slower, and there is variability in estimating abundance by size, if it was possible survey results from this year were just a second estimate of the same sublegal (or pre-recruit) year class. It was generally felt by the science team this was not the case, as the size group is experiencing its maximum growth rate and cohorts are usually very apparent as a result. The science team noted however, that it is possible the high 2013 year class was resultant of combined spring and fall spawning, given environmental conditions were favourable for this in 2013.

Condition

A measure of scallop condition based on meat weight at 100 mm shell height was discussed. It was noted the condition of scallops change in different subareas, and while there might be more scallops in the survey, condition of scallops might not be as good. The presenter drew attention to a slight error in the condition equation presented in the Working Paper, indicating that it had since been corrected.

A meeting participant requested clarity regarding observed multiplicative error associated with condition. The presenter replied that as shell height increases the range of possible meat weights associated with that height stays the same in the model, although in reality this does not occur. This was a problem with the previous method that assumed an additive error. In this assessment approach, the range of possible meat weights increased with shell height. A reviewer asked if divergence of condition in subarea A could be related to the stock being fished down, and the presenter responded that this was unlikely given that condition is typically related to environmental conditions rather than fishing impacts. The reviewer further inquired if condition demonstrated a tradeoff between meat size versus reproductive success. The presenter noted that over the fishing season there is a tradeoff between energy going into meat size versus reproduction. The presenter concluded that if the survey was being conducted at different times of year this might prove problematic, but given the survey is conducted at the same time each year it should not pose a problem with the analysis. In general, the literature suggests that when condition is low it is likely that scallops do not spawn.

Low condition can make the animals more susceptible to all sorts of different stresses that may lead to increased mortality that is not necessarily due to reproduction alone. A meeting participant asked how natural mortality was determined, and it was indicated the parameter is estimated from the 'popcorn' model described at the last framework assessment meeting for the fishery (see: Smith et al. 2015). A member of the science team indicated that 'clappers' are

measured in relation to live animal catch, and the science team does try to adjust for the time in which clappers stay together in the subarea before breaking. For instance, when reviewing the ratio of clappers to live animals, mortality has recently decreased compared to earlier in the time series, although catches were also much higher at that point. As such, using clappers as an index of larger mortality events is appropriate, but using it as an index at low abundance is not as effective. That said, the science member noted that large mortality events, as indicated by clappers, has not been observed.

Biomass

The impact of habitat degradation on biomass was discussed. It was asked if the science team interpreted a loss of biomass in high suitable habitat as habitat degradation, as well as how the team determined what constituted habitat degradation (e.g. a hurricane can go through and change everything in the high energy environment). A member of the science team indicated that one can infer by analogy from other scallop areas that this is not an issue; for example, other areas have been dragged for much longer periods of time and still support high population events (Bay of Fundy has been dragged since the 1930s and the scallop populations persists). A peer reviewer noted this not being an issue is important, as it means the underlying assumptions of the model are sound. It was clarified that catch information for the fishery has been available from commercial logbooks since 2001. Fishing location is also provided in logbooks, and VMS has been used in this fishery since 2001 (although the department did not start storing the data until 2002).

Reference Points

Presenter: Stephen Smith

Consistent with DFO's Precautionary Approach (PA) framework, possible reference points were explored for management purposes for the SFA 29 West fishery. Reference points for the fishery will continue to be discussed within the fishery's advisory committee forum. The presenter presented a Working Paper that explored an approach for defining possible reference points that may be considered for the fishery at some point in the future.

Discussion began with a focus on recruitment. The presenter noted that the model did not incorporate settlement, and instead focused on what is on the bottom post-settlement (i.e. a recruit survival relationship). The presenter noted that scallops are a challenge because they do not congregate to spawn; they spawn where they end up. As such, adults in an area compete with juveniles for resources. A peer reviewer asked if the model approach of just focusing on the area inside the best fishing grounds is sufficient. The presenter responded that other areas are not ignored; however, the model aims to derive a reference point based on high habitat areas even though the medium and low habitat areas still remain important elements of the assessment. It was asked if recruitment from areas outside of SFA 29 West might have a significant impact on the stock in the area. Habitat is considered to be a limiting factor to recruitment and not just larval supply. It was further noted that environmental factors impact recruitment differently on an annual basis, but there has to be a threshold for when there is not enough brood stock to maximize total population. In addition, areas of low/medium habitat might be below the density to make a significant impact on reproduction. In SFA 29 West, most of the larvae likely come from the high habitat areas due to density effects. It was clarified that because there is very little area classified as high suitability in subarea A, medium habitat is used for modeling purposes.

A peer reviewer asked if fishing rates from medium habitat areas would be better to use to scale reference points because medium habitat exists in all subareas. The presenter indicated that this is possible, but that analysis demonstrates that fishing pressure is higher in the high habitat

areas, so one would set more precautionary reference points by looking at them. If one worked with trying to optimize catch rate based on the medium habitat, it would actually result in overfishing in the high habitat areas. If one focused on high areas, it would not result in over-exploitation in the medium and low areas. The presenter noted that all areas are being fished, but at different levels of fishing intensity. Thus, effort will shift into or out of the high areas depending on how catch rates are going in the high areas (when catch rates in high areas decrease more effort will move to medium areas and as catch rates in high areas increases more effort will occur in the high areas). The presenter noted there is consistency over time on the high habitat areas that show it is a useful proxy. In general, looking at where the stock has been and where it is now, the presenter reflected that it is hard to look at biomass and not believe it is approaching a critical zone with regard to a level that can sustain a commercial fishery.

A peer reviewer inquired as to the science team's thoughts on the 40% and 80% reference points put forward as the standard DFO approach, wondering if the team felt they should be more conservative based on scallop biology. The presenter indicated that these reference points were selected as a starting point for discussion given that they are outlined in DFO policy, although also noting the 40% reference point is based on fin fish case studies likely driven by a Beverton-Holt stock-recruitment curve. Given this, the reviewer noted it might be worthwhile to think about whether this is appropriate for scallop, as the discussion of fishery reference points continues. Another member of the science team further noted that evidence suggests there is a density dependence of scallop based on habitat type, so it would be worth looking at the 40% reference point in further detail to assess its applicability to the fishery.

A meeting participant reminded the group that the 40% and 80% reference points are to be considered a guide, as noted in the DFO policy, in the event there is not enough information to define stock-specific reference points. The participant further noted that since the 2001/2002 scallop biomass could be considered virgin biomass other approaches for defining reference points could be pursued. The presenter cautioned that one should not assume 2001/2002 biomass as virgin biomass, given there was fishing in SFA 29 in 2001; thus, it is not known what the biomass was prior to the 2001 fishery. It was generally agreed that the Upper Stock Reference appeared reasonable. In contrast, in the event of recruitment failure, not knowing with certainty when reproductive capacity might be impaired, it is more difficult to determine what an appropriate Lower Reference Point should be. It was recognized that the discussion on reference points for this fishery will need to continue.

Peer reviewers and meeting participants felt both Working Papers were thorough, scientifically sound, and well done. There were some minor questions posed to the presenters throughout the assessment meeting, and it was agreed minor comments would be forwarded to the science team for incorporation into revised papers prior to finalization as a Research Documents.

REVIEW OF SCIENCE ADVISORY REPORT

Presenter: Jessica Sameoto

Meeting participants reviewed the Science Advisory Report (SAR) section-by-section; the document was similar to the last version of the advisory report previously agreed upon in March 2014. It was noted that bycatch was not discussed in detail at the assessment meeting, although information was presented in a Working Paper and is in the SAR. One meeting participant inquired if the TACs presented in the SAR were correct, and the presenter noted it is a bit confusing as the science quota was included in the total TAC numbers originally sent out, which made the overrun look like it was higher. The issue was that the TAC given in the Quota reports did not include the Science quota, while the landings did, suggesting a higher overrun

than was true. The TACs in the SAR included the Science quota. It was noted, however, that one TAC value presented in the SAR was incorrect and would be updated with the correct number prior to publishing the report. The discussion then focused on closures. A meeting participant asked who proposed the closures in subareas C and D to protect the incoming year class, and it was noted closures are based on discussions between DFO and Industry.

There was significant discussion on the cause of the missing year class of pre-recruits: did they die from natural mortality given that no fishing occurred in subareas C and D in 2014 or did they move to another area outside of the survey area. The presenter noted similar situations have been observed on German Bank, where large pre-recruit classes were observed and then subsequently disappeared. One harvester felt the cause of the missing recruitment was migration eastward out of the survey area, possibly due to currents. The presenter responded that there is a very good chance they died, as they are very susceptible at this age, and the decline in condition noted for 2014 may have been indicative of less than ideal environmental conditions over the past year. The presenter further noted that the survey design was adjusted to look for the year class, but with the exception of areas in subarea D, this year class no longer could be found in large numbers. It remained that the harvester did not feel the evidence presented could conclude with certainty the year class died, and perhaps characterizing as 'possibly' in the SAR was the best that could be done. In contrast, another harvester felt high mortality was appropriately documented for young year classes although, in contrast, it cannot be stated with certainty the year class is known to have migrated significantly. It was generally agreed that the cause of the missing year class, either due to mortality or migration, could not be resolved with certainty in the SAR.

Last, it was requested the SAR use the terminology "Area 29 licence" rather than "inshore East of Baccaro licence" – this required further investigation by DFO Resource Management to ensure consistency with its characterization of these licences. DFO Resource Management subsequently advised that this change in terminology did not accurately describe this licence, and that the originally-proposed terminology was correct (i.e. "inshore East of Baccaro licence"). This decision regarding terminology used in the SAR was communicated to the applicable industry representative by email and by telephone prior to publication of the report. It remained, however, that the individual did not agree with the decision, viewing the terminology in the SAR as inaccurate and inconsistent with the characterization of these licences as described by regulation. Despite this refuted point, in general meeting participants felt the SAR was well-written and suitable for publication. The SAR received consensus at the meeting.

CONCLUSIONS

Meeting participants felt the Working Papers presented sound scientific analyses based on the best available information on SFA 29 West scallop, and are acceptable for publication as Research Documents pending revision following discussions of the meeting. There was also support for publishing the proposed Science Advisory Report provided edits discussed at the meeting were adopted in its final format. Sincere efforts were made in this science peer review process to acknowledge and address all comments and concerns raised by meeting participants provided they were appropriate and within the confines of acceptable peer review practice. The Science Advisory Report received consensus at the meeting.

REFERENCES CITED

DFO. 2014. Assessment of Scallops (*Placopecten magellanicus*) in Scallop Fishing Area (SFA) 29 West of Longitude 65°30'W. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/031.

Smith, S.J., Nasmith, L., Glass, A., Hubley, B., and Sameoto, J.A. 2015. Framework assessment for SFA 29 West scallop fishery. DFO Can. Sci. Advis. Sec. Res. Doc. 2014/110. v + 69 p.

APPENDICES

APPENDIX 1: LIST OF MEETING PARTICIPANTS

Name	Affiliation
Bowlby, Heather	DFO Maritimes / Population Ecology Division (BIO)
Bravo, Monica	DFO Maritimes / Population Ecology Division (BIO)
Burnie, Carmen	Full Bay Scallop Association / LBM Fisheries
Cantafio, Justin	Ecology Action Centre
Curran, Kristian	DFO Maritimes/ Centre for Science Advice
D'Entremont, Alain	Scotia Harvest Seafoods / O'Neil Fisheries Ltd.
Docherty, Verna	DFO Maritimes / Resource Management
Fry-Buchanan, Joy	Atlantic Herring Co-op / Full Bay Scallop Fleet Association
Gaudette, Julian	DFO Maritimes / Population Ecology Division (BIO)
Giroux, Brian	Area 29 Licence Holder Representative
Glass, Amy	DFO Maritimes / Population Ecology Division (BIO)
Hatt, Bill	SWNS SFA 29 West
Lowe, Jonathan	Nova Scotia Department of Fisheries & Aquaculture
Nasmith, Leslie	DFO Maritimes / Population Ecology Division (BIO)
Newbould, Andrew	DFO Maritimes/ Centre for Science Advice
Reeves, Alan	DFO Maritimes / Population Ecology Division (BIO)
Sameoto, Jessica	DFO Maritimes / Population Ecology Division (BIO)
Smith, Colleen	DFO Maritimes / Policy & Economics
Smith, Stephen	DFO Maritimes / Population Ecology Division (BIO)

APPENDIX 2: MEETING TERMS OF REFERENCE

Assessment of SFA 29 West of 65°30' Scallop

Regional Peer Review - Maritimes Region

March 24, 2015
Dartmouth, Nova Scotia

Chairperson: Kristian Curran

Context

This scallop fishery has taken place in the portion of SFA 29 west of longitude 65°30'W since 2001. The Full Bay scallop fleet was the sole participant in 2001. Starting in 2002, the total allowable catch (TAC) was shared between the Full Bay fleet and a limited number of inshore East of Baccaro (EoB) licence holders who are eligible to fish in SFA 29 West. As of 2010, the TAC and landings are reported as totals by subarea for both fleets combined. In support of the fishery for SFA 29 west of 65°30' scallop, DFO Maritimes Fisheries and Aquaculture Management Branch has asked Science Branch for an assessment of resource status and the consequences of various harvest levels for the coming fishing season. This meeting is a scientific review of the assessment and projections undertaken in support of the 2015 fishery. The last assessment of the fishery was completed on March 13, 2014 (DFO 2014). A science update was scheduled for SFA 29 West in 2015; however, due to observations from the survey in 2014 that the extremely high year class which prompted the closure of subareas C and D in 2014 did not survive, a full assessment has been triggered.

Objectives

- Assess the status of SFA 29 west of 65°30' scallop stocks by subarea as of the end of 2014.
- Evaluate bycatch of lobster during the 2014 fishery. Identify all information on fishery by-catch of non-target species that may be available and, if available, identify any notable changes in occurrence of bycatch species relative to previous years.
- Evaluate the consequences of different harvest levels by subarea during the 2015 fishery on stock abundance and exploitation rate.

Expected Publications

- CSAS Science Advisory Report
- CSAS Proceedings
- CSAS Research Document

Participation

- DFO Science
- DFO Fisheries & Aquaculture Management
- Aboriginal communities / organizations
- Provincial (NS and NB) governments / Industry

References

DFO. 2014. Assessment of Scallops (*Placopecten magellanicus*) in Scallop Fishing Area (SFA) 29 West of Longitude 65°30'W. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/031.

APPENDIX 3: MEETING AGENDA

Assessment of SFA 29 West of 65°30' Scallop

Regional Peer Review - Maritimes Region

March 24, 2015
Dartmouth, Nova Scotia

Chairperson: Kristian Curran

DRAFT Agenda

09:00 - 09:15	Introduction
09:15 - 10:15	Presentation of SFA 29 West analyses
10:15 - 10:30	Break
10:30 - 12:00	Review of analyses
12:00 - 13:00	Lunch
13:00 - 14:30	Review of Science Advisory Report
14:30 - 14:45	Break
14:45 - 16:00	Review of Science Advisory Report (con't)